

Deep Space Navigation and Timing Architecture and Simulation, Phase I

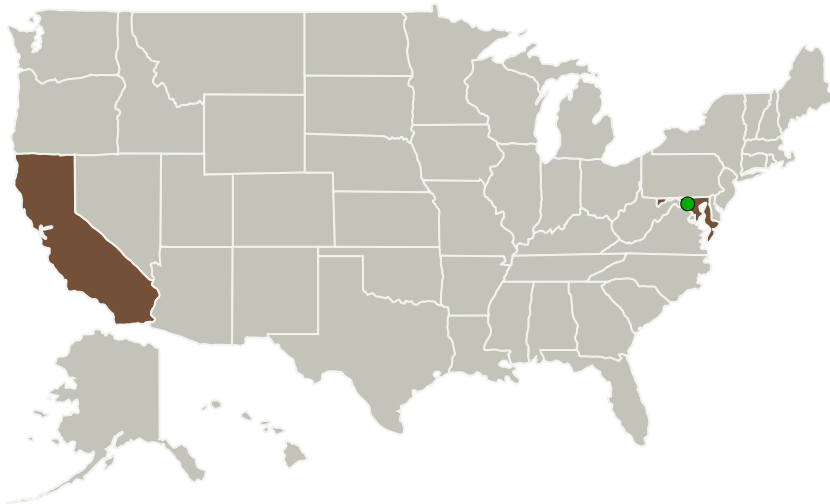
Completed Technology Project (2010 - 2010)



Project Introduction

Microcosm will develop a deep space navigation and timing architecture and associated simulation, incorporating state-of-the art radiometric, x-ray pulsar, and laser communications measurements. The solution will center on the maintenance and propagation of navigation states, time and associated uncertainties onboard each platform with filtering capabilities enabling updates based on all available data. Such data would include: direct state and uncertainty updates via ground communication, radiometric- and lasercom-based range and range rate data from communication with ground stations and other spacecraft, time transfer from ground stations and other spacecraft, and X-ray pulsar-based navigation and time measurements (XNAV). This would enable significant improvements in spacecraft navigation and time determination for the majority of systems without access to GPS, and would improve solutions for systems with GPS. With inter-vehicle communication, the line-of-sight (LOS) navigation precision achievable with current radiometric techniques can be achieved in the direction normal to the LOS from the Earth. XNAV enables onboard measurements for improved or autonomous navigation and time determination. Phase I will develop the architecture, performance estimates, and simulator requirements and preliminary design. Phase II will focus on detailed simulation development and on the transition of the capabilities into key NASA tools.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Microcosm, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Hawthorne, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

California	Maryland
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Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139980>)

Organizational
Responsibility**Responsible Mission
Directorate:**Space Technology Mission
Directorate (STMD)**Lead Organization:**

Microcosm, Inc.

Responsible Program:Small Business Innovation
Research/Small Business Tech
Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

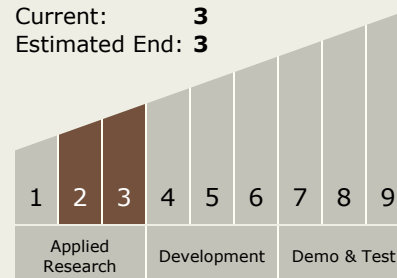
Paul Graven

Technology Maturity
(TRL)

Start: 2

Current: 3

Estimated End: 3



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.2 Navigation Technologies
 - └ TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System